

**Meeting Summary
ETV Water Quality Protection Center
Watershed Protection Technologies
Stakeholder Advisory Group**

**September 11, 2002
Orlando, Florida**

Opening Comments

NSF International convened a meeting of the Environmental Technology Verification (ETV) Water Quality Protection Center - Watershed Protection Technologies Stakeholder Advisory Group on September 11, 2002 in Orlando, Florida. This meeting was scheduled to take place immediately following the annual WaterReuse symposium, in the hopes that additional water reuse professionals would participate. A list of meeting participants is provided as Attachment 1. Tom Stevens, NSF pilot manager for the source water protection area of the ETV Water Quality Protection Center, reviewed the goals for the meeting:

- Update ETV program activities;
- Update WQP Center / SWP Pilot activities;
- Prioritize future technology areas; and
- Identify homeland security efforts.

A break in the meeting was taken to attend the hotel's September 11th memorial service in the lobby at 8:46 a.m. Self-introductions were made by meeting participants.

Since this was the first ETV meeting for several attendees, Mr. Stevens provided a brief review of background information on the ETV Program. He explained that the ETV Program verifies commercial-ready environmental technologies through third party testing and evaluation of the resultant quality-assured data. This process provides potential technology purchasers and permittees with an independent and credible assessment of the technology that they are buying or permitting. Specific environmental technology areas are addressed by ETV "centers". Centers are partnerships between the U.S. Environmental Protection Agency (EPA) and public and private testing and evaluation organizations such as NSF. For clarification, the ETV Source Water Protection Pilot is in the process of combining with the ETV Wet Weather Flow Pilot to form the ETV Water Quality Protection Center. Because NSF is well known for its standards development and product certification services, Mr. Stevens stressed that the ETV Program does not approve, endorse or certify technologies and described the differences between verification and certification. Both verification and certification utilize standardized test methods and independent performance evaluations, and include formal reporting of the test results. However, certification and verification differ in that certification does not involve the broad distribution of test reports and includes pass/fail criteria (verification does not). In addition, certification has additional requirements,

including the auditing of manufacturing facilities, periodic retesting, and mandatory review of product changes, all of which verification does not.

The future of the ETV Program was discussed. Although the pilot period of the program has ended, the ETV centers continue to receive financial support from EPA, with expectations for increased vendor responsibility for the test costs. Future EPA support of the Water Quality Protection Center will primarily focus on managing stakeholder groups and protocol maintenance.

Water Quality Protection Center Update: Source Water Protection Area

Urban Infrastructure Rehabilitation Technologies

Protocol/generic test plan development is underway in four urban infrastructure rehabilitation areas: grout materials, coating materials, pipe liner materials, and pipe bursting technologies.

Ship Ballast Water Treatment Technologies

The Water Quality Protection Center is working cooperatively with the U.S. Coast Guard to develop a protocol for evaluating technologies that treat ship ballast water. Effective ballast water treatment is critical for control of invasive species. There has been a lot of international interest in the pilot's developments in this area.

Decentralized Wastewater Treatment Technologies

Four technologies have completed a year of testing under the *Protocol for the Verification of Residential Wastewater Treatment Technologies for Nutrient Reduction*. The verification reports for these technologies are currently being drafted. The ETV Water Quality Protection Center is currently developing a test plan for evaluating a technology under the *Protocol for the Verification of Wastewater Treatment Technologies*. The verification test for this technology will take place at an actual installation, which treats domestic wastewater from a small community of upscale homes in Idaho. Protocol development activities for disinfection technologies for small systems have recently been reinitiated after being on hold.

Water Quality Protection Center Update: Wet Weather Flow Technologies

Protocols have been developed for the following wet weather flow technology categories:

- Flow meters;
- Stormwater treatment;
- High-rate separation;
- Models; and
- High rate disinfection
 - UV systems; and
 - Induction mixers.

Four verification tests of wet weather flow technologies have been completed and an additional four are underway.

Watershed Protection Technologies

Mercury Amalgam Removal Technologies

The primary purpose of mercury amalgam removal technologies is to remove mercury and other contaminants from wastewater before it leaves the dental office. With improved analytical methods allowing for detection of lower concentrations of mercury, mercury in dental wastewater is being monitored and restricted more closely than ever before. Seattle, Washington, has established a deadline of July 2003 for voluntary compliance with discharge regulations, and several cities in Canada have enacted regulations for discharge of mercury from dental offices. The ETV *Protocol for the Verification of Mercury Amalgam Removal Technologies* measures the removal of both amalgam solids and soluble mercury, and specifies that verification tests take place using actual installations (not a laboratory setting).

The results of the verification test of the Dental Recycling North America (DRNA) unit were discussed. The DRNA system consists of two stages of treatment, a particulate separator and an adsorbent column. The system was more than 98 percent effective in removing total mercury. Now that the first ETV test of a mercury amalgam removal technology has been completed, the test plan and protocol will be reviewed and revised as necessary, based on the lessons learned. The characterization phase that preceded the verification test may be reduced in the next revision of the protocol, since the mass balance approach was effective in determining mercury reduction during the DRNA test. In addition, the test period for the technology evaluation may be lengthened.

There was discussion about the prevalence of dental offices that use onsite systems and what the effects of mercury on those systems might be. The SAG also discussed other potential pathways of mercury in a dental office. For example, if amalgam particles adhere to the shirt the dentist is wearing, they will enter the waste stream when that shirt is laundered. Some dentists have admitted to throwing away leftover dry amalgam or flushing it down the toilet.

In-Drain Treatment Technologies

The ETV Water Quality Protection Center is in the process of initiating testing of in-drain treatment technologies, which typically use absorbents placed in floor drains to remove hydrocarbons, metals, solids, surfactants and nutrients from water. Applications for in-drain treatment technologies include machine repair shops, fuel dispensing areas, and industrial operations. ETV testing of in-drain treatment technologies will take place in a controlled setting designed to simulate actual conditions. The first verification test of an in-drain treatment technology, the Hydro-Kleen Filtration System, will be performed in the NSF laboratories. Contaminant removal, media capacity and required maintenance will be verified.

UV-Related Verifications

The ETV Water Quality Protection Center has worked with HydroQual, Inc. to develop a protocol for evaluation of UV disinfection technologies for water reuse and secondary effluent. This protocol will be finalized soon. Karl Scheible (HydroQual, Inc.) explained that the protocol examines the following factors as part of the verification process: 1) dose-delivery under prescribed operating conditions, 2) lamp output, 3) quartz fouling factor, 4) process control logic, and 5) the response of sensors and alarms. The protocol is “menu-based”, which allows the vendor flexibility to select the number and scope of verifications to be completed on their technology.

With respect to reuse applications, the ETV protocol is consistent with NWRI/AwwaRF Guidance. The protocol provides three testing scenarios for water reuse applications: granular/cloth media filtration (55 percent transmittance (T), with filtered effluent), membrane filtration (65 percent T), and reverse osmosis (90 percent T). Following are additional characteristics of the reuse applications protocol:

- Minimum two reactors in series;
- Scale up at no greater than factor of 10;
- Dose-delivery validation at a minimum of 5 flows at selected UVT: MS2 coliphage challenge organism;
- Adjust for fouling factor and aging factor via altered UVT or “dimming” – default factors are 0.5 and 0.8;
- Alternate factors must be verified;
- Sensor must be properly positioned;
- Dose calculation algorithm is verified/demonstrated; and
- Velocity profile must be characterized.

For secondary effluent applications, the protocol outlines testing scenarios with transmittances of 55, 65, and 75 percent. All units are tested with a 70 percent power rating and 100 percent fouling factor.

MS2 bacteriophage is the challenge organism for dose-delivery validation, since it is easy to cultivate and is benign. MS2 bacteriophage was selected originally because it is similar in shape to the polio virus, with many of the same general characteristics. However, MS2 bacteriophage is more resistant to treatment by UV than the polio virus.

HydroQual has partnered with a wastewater treatment plant in Parsippany-Troy Hills, New Jersey, to provide a testing site for UV technologies evaluated under the ETV program. The site offers easy access to potable water, primary effluent, and filtered (granular media) final effluent, and can accommodate a maximum of three test systems at one time. Tests are run on a batch basis. Batch tanks are used to vary the transmittances of the test water and for MS2 bacteriophage seeding.

Flushed Swine Waste Solids Separation

Dr. John Classen (North Carolina State University) reviewed the test plan that was developed for evaluating solids separation technologies for flushed swine waste. Solids

separation allows for lower nutrient loading in lagoons, fewer odors, and potentially smaller lagoons. Almost all pig feed for the several million pigs in North Carolina comes from the Midwest and there are concerns that the southeast is becoming a nutrient sink.

Dr. Classen described the test facilities at NCSU and provided a general overview of the verification test of the Triton Separator that took place this summer. North Carolina State University manages the Lake Wheeler Road test site and the Environmental Analysis Laboratory is used to evaluate the Triton Separator. The Lake Wheeler Road Field Laboratory Swine Educational Unit has a capacity of 250 sows for farrow to wean, and can finish approximately half of the weaned pigs. The site uses a water wash waste handling system; since it is a research facility, the pig population is not maximized and conserving costs/flush water is not as critical as it is on commercial farms. Therefore, the waste produced at the test site is more dilute than typical producers'. Generally, wastewater at the site contains between 0.2 and 0.3 percent solids, but by allowing the waste to sit in the houses for two days prior to washing (a procedure specific to the ETV test program), the solids content increases to around 1 percent. When ETV testing is not occurring at the test site, the barn systems are set up to flush several times per day. Testing occurs three days a week for four weeks (for a total of twelve days of testing).

The generic ETV test plan calls for a mass balance approach for evaluating performance of the separators. In addition to the analytical testing, power consumption and any operational problems/notes are recorded. Target parameters for the test include nitrogen, phosphorus, potassium, electrical conductivity, total, volatile, and suspended solids, chloride, total coliform, E. coli, and copper and zinc, which are common feed additives. The vendor may request that additional parameters than those specified in the generic test plan be analyzed during the verification test.

North Carolina State University conducted one test earlier this year on the Triton Systems centrifuge. Some of the lessons learned during this first round of testing were:

- a complete operations manual must be provided by the vendor prior to the start of testing;
- a vendor representative should be available for technical assistance, especially during the start up phase;
- test personnel should be familiar with the test plan as a whole; and
- scheduling of sampling and laboratory analyses is critical – testing should start early in the day to get samples to the lab as early as possible.

Changes to be made before next round of testing include hiring additional laboratory and field staff, adding additional on-site testing capabilities, increased communication with farm staff and other researchers. Dr. Classen also recommended that the generic test plan be revised to provide the vendor more flexibility with the amount of time allowed for technology set up (though both NSF and NCSU stressed the need to keep this to a minimum).

Aeration System Technology

Tom Stevens described the test plan currently being written for an aeration system technology. The technology is a unique means for introducing dissolved oxygen into lagoons, rivers, and groundwater. The vendor claims that the technology is capable of supersaturating water under pressure to about 800 mg/L DO. Then, the supersaturated water is reintroduced to the environment without a significant reduction in DO levels. Testing of the unit for both lagoon and river applications is expected to begin in early 2003.

Potential Technology Areas for Future Protocol/Test Plan Development

Potential technology areas previously identified for future protocol/test plan development under the ETV Water Quality Protection Center include:

- Agricultural areas
 - Liquid waste treatment
 - Modified animal feed
 - Precision agriculture
- Car wash and funeral home waste treatment
- Spill containment and control
- Membrane liners
- Surface water restoration
- Soil stabilization/erosion control
- Barrier curtains
- Water reuse technologies
- Homeland security technologies
 - Decontamination cleanup
 - UV treatment

Mr. Stevens requested SAG provide input on which technology areas should be prioritized for future protocol development and testing under the ETV Water Quality Protection Center. He stressed that the technologies have a positive environmental impact and that there be commercial-ready technologies available for testing.

Mr. Scheible suggested looking at membrane technologies for water reuse and homeland security applications. In addition, some ballast water treatment technologies may use membranes.

Jim Cameron (Cameron Equipment Co.) discussed the Cameron Fluid Recycling System, which dewateres drilling muds (from drilling for oil and gas in fresh and saltwater). Dewatering drilling muds reduces the numbers of cutting barges needed to transport sediments. Treated water may then be reused in the drilling operation. Some of the major concerns with current drilling procedures include the volume of waste generated, toxicity of the waste, and how to dispose of it. It is estimated that the disposed solids typically contain up to 80 percent water (water that could be reused in the drilling process). Thousands of wells are drilled every year. For more information about the Cameron Fluid Recycling System, please contact Mr. Cameron at 361-777-3071.

It was suggested that the Pilot look into technologies (likely to include activated carbon) that can treat pharmaceuticals, as these are increasingly showing up in on-site systems and in watersheds to which WWTPs discharge.

It was noted that in Florida, regulators are interested in obtaining more performance data for soil stabilization technologies, car wash and funeral home waste treatment technologies, and membrane liners.

Len Bull (NCSU) discouraged the group from developing protocols for modified animal feed, as he feels that manufacturers will not want to disclose their ingredients.

The technology areas of interest included:

- UV disinfection technologies for homeland security (verifying higher dose levels, different operating conditions, different organisms (simulating anthrax spores, for example));
- Precision agriculture;
- Granular/artificial media filtration for wastewater treatment (synthetic versions of sand filters, including “fuzzy filters”);
- Contaminant containment protocols (ex: for washdown water from washing down crews potentially exposed to anthrax);
- Soil stabilization/erosion control; and
- Membranes and artificial media filtration for water reuse.

It was suggested that the SAG be expanded to include more water reuse stakeholders. Len Bull (NCSU) seconded this, as water reuse is quite common in the agricultural area (reuse for the animals’ drinking water).

Tom Stevens proposed that NSF determine the number of vendors and the level of vendor interest in each of the proposed areas for protocol development. Jami Montgomery, Max Burchett, and Len Bull agreed to assist with this task.

Attachment 1

Meeting Participants

Participant	Organization
Jami Montgomery	Water Environment Research Foundation
John Classen	North Carolina State University
Deanna Fraker	R&D Services
Gerry Miller	Black & Veatch
Doug Norton	USEPA – Office of Wetlands, Oceans and Watersheds
Karl Scheible	HydroQual, Inc.
Leonard Bull	North Carolina State University
Gordon Bellen	NSF International
W. Bruce Peirano	USEPA/ORD/NRMRL
Mark Hooks	Florida Department of Health
Max Burchett	Whitley, Burchett & Associates
Gary Grinnell	Las Vegas Valley Water District
Charles Vanderlyn	USEPA - Office of Wastewater Management
James Converse	University of Wisconsin – Madison
Dave Nieman	Minnesota Rural Water Association
Jim Cameron	Cameron Fluid Recycling Systems
Maren Roush	NSF International
Tom Stevens	NSF International